THE CITY OF
COLUMBUS
ANDREW J. GINTHER, MAYOR

CIVIL SERVICE COMMISSION

Safety Forces Testing

2017 FIREFIGHTER STUDY GUIDE

Table of Contents

Introduction

Thank you for your interest in employment with the City of Columbus! This study guide is intended to help candidates perform at their best in the Firefighter Entry-Level Examination process. It contains information about the test, sample questions, and information on test-taking strategies that may improve your score. Reading this guide and studying pertinent content may assist you in preparing for the Firefighter examination. Your journey to becoming a firefighter will require dedication and discipline to be successful. During the selection process, you will receive several email notifications to inform you of the next step in the process. Be sure to read each notice carefully. If you have any questions regarding this study guide or the testing process, please call 614-645-0879 or email us at policefiretesting@columbus.gov

The most publicized aspects of the job of Firefighter are the preservation of life and property primarily through fire suppression. However, most firefighters are responsible for much more and a Columbus Firefighter is no different. The job of Firefighter is a physically demanding job. On the fire scene, you may be required to climb several flights of stairs, maintain water flow for long periods of time, or carry victims from dangerous situations. There are a variety of other tasks on the fire scene that must be carried out as quickly and efficiently as possible to preserve your life, the life of victims, and the lives of other first responders. In addition, Columbus Firefighters are required to perform several tasks between fire alarms. These tasks include maintaining/repairing equipment, cleaning equipment and the fire station, inspecting buildings and hydrants, learning area streets, training at the station, at the training academy and on-line, giving tours to school-aged children and many other tasks. The schedule of a typical Columbus Firefighter is 24-hours on-duty and 48-hours off-duty. This averages to a 48-hour work-week. Every third week, the Firefighter has a Kelly Day (an additional day off-duty). An example of a 3-week Kelly Cycle is as follows:

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Work 24hours	Off	Off	Work 24 hours	Off	Off	Work 24 hours
Off	Off	Kelly Day Off	Off	Off	Work 24 hours	Off
Off	Work 24 hours	Off	Off	Work 24 hours	Off	Off

In the example above, the firefighter has a Kelly Day of Tuesday, therefore, each workday that falls on a Tuesday; this firefighter will not be scheduled to work. This Kelly Cycle repeats every three weeks. Kelly Days are selected by seniority (the most senior firefighters are given first choice) therefore, newer firefighters will not likely have Friday, Saturday or Sunday as a Kelly Day.

Columbus Firefighters receive extensive training throughout their career beginning with the initial 33 to 35 week paid fire training academy. During this time, recruits work first shift and return home in the evenings and on weekends. Once the initial training at the academy is complete, each firefighter is assigned a fire station based on the needs of the Division of Fire. Upon completion of the training academy each firefighter must maintain a valid Firefighter II and Fire Safety Inspector Certification issued by the State of Ohio. Additionally, the firefighter will begin a 3-year journeyman program where learning continues on the job and is complemented with traditional book work, online, class instruction and examinations. The Division of Fire must maintain a required number of Firefighters who possess an Emergency Medical Technician-Paramedic certificate. A large number of City of Columbus Firefighters are required to obtain

and retain this certificate after becoming a Journeyman Firefighter. Of course, firefighters may volunteer to be a paramedic; however, the aforementioned training as a firefighter must be completed first.

The Entry-Level Firefighter Examination for the City of Columbus is designed to test the knowledge, skills, and abilities that are important to the job of firefighter with the City of Columbus, Ohio.

Overview of Test Phases

The Firefighter Entry-Level Examination is a multi-phase test. The entire examination process consists of three phases. The three phases are as follows:

Phase I—Multiple-Choice Exam

Subtests

Situational Judgment Test (SJT)
Map Reading and Following Directions
Mathematics
Reading Comprehension
Mechanical Aptitude

Phase II—Firefighter Mile

Events

1. Stair Climb
2. Paced Walk
3. Hose Advance
4. Equipment Haul
5. Paced Walk
6. Blind Crawl
7. Forcible Entry/Tire Strike
8. Paced Walk
9. Victim Rescue
10. CPR

Phase III—Fire Oral Assessment Mechanism (FOAM)

Scored Abilities

Problem Sensing & Resolution
Interpersonal Relations

Later sections of this study guide will provide more specific descriptions of the phases.

Important Notes About the Exam

- Late candidates WILL NOT be admitted into the exam, so arrive early to avoid disappointment. Once the exam instructions begin, no additional candidates will be admitted to the testing room.

- Please bring a printed copy of your admission notice and your driver's license to the test site.

- All phases of the examination process will take place at the City of Columbus Civil Service Offices at 750 Piedmont Road, Columbus, OH 43224. Questions call (614) 645-0879.

Scoring

The entry-level firefighter exam will be scored as follows:

Phase I	Multiple-Choice	Pass/Fail
Phase II	FOAM	Band/Fail
Phase III	Firefighter Mile	Pass/Fail

The Multiple-Choice and Firefighter Mile phases of the examination process will be scored on a pass/fail basis. Your oral exam score will be weighted as 100% of the final score for those who pass. ***New for this administration*** only those who pass Phases I and II will be invited to Phase III, the Firefighter Mile. Only those who receive passing scores on all phases of the examination process will be placed on the eligible list.

Phase I – Multiple-Choice Exam

This section of the study guide provides information about the Multiple-Choice Examination. It is designed to 1) provide you with strategies for taking the test; and 2) give you a better understanding of the content of the examination.

Calculators and dictionaries are prohibited during the examination process.

General Test Taking Strategies for Phase I

- Try to get a good night's sleep before the test. It is important that you are well rested so you can do your best.
- Eat appropriately prior to the test. Too little or too much food can hinder your performance, rather than help.
- Be sure you know where the test center is located. It is recommended that you arrive before your scheduled time. Refer to your admission notice for the exact date and time. Driving by the exam location on a date prior to your exam may be helpful.
- Business attire is **not** required. We recommend that you bring a sweatshirt or sweater and dress in layers so that you can adjust your comfort to fit the temperature of the room.
- When you arrive at the test site you are to check in and you will then be assigned a seat. Try to relax and get comfortably settled as quickly as possible.
- Be sure to listen and follow all directions.

- Do not waste time on problems that are too hard. Skip them and go to the next question. If time permits, you may go back later. There is no penalty for guessing. The test is not designed to have trick questions. If you know the answer to a question mark it accordingly.

- Feel free to write in your test booklet. This may help you to reason through various test questions. However, be sure to mark all final answers on your answer sheet to receive credit.

A Quick Overview of the Answer Sheet

There are some important things you will need to know about the booklet and answer sheet:

- When you have chosen your answer to a test question, find the number of that question on the answer sheet.

- Fill in the lettered circle that matches the answer you have picked. Be sure you are on the same number in both the test book and the answer sheet!

- Blacken the circle you have picked with a heavy pencil mark. Be certain to darken the circle completely.

- Erase completely any answers you wish to change. Do not cross them out.

- Do not make any unnecessary marks on your answer sheet.

- You should not mark more than one answer to any question. In all test sections, multiple answers will be scored as wrong answers.

Multiple-Choice Subtests

The multiple choice exam includes many types of test items which are divided into five subtests: 1) Situational Judgment; 2) Map Reading and Following Directions; 3) Mathematics; 4) Reading Comprehension; and 5) Mechanical Aptitude. The test will cover each of these five subtests.

Subtest 1—Situational Judgment

The Situational Judgment portion of this subtest is a video-based assessment. This portion of the examination will assess judgment required for problem solving in work-related situations. For this test, you will be shown several scenarios. Each scenario will be presented in a non-fire related work setting. At various points in the scenario, one of the employees will be placed in a situation that requires a response. In each situation, you are presented with several possible responses by the employee. You will be required to judge the effectiveness of each response. You will need to make decisions on your ratings quickly, as you will be provided 10-15 seconds to rate each response. Additionally, responses will only be played ONE TIME, during the scenario. The video will be played one time in its entirety and will not be stopped at any time. DO NOT wait until the end of the test to rate any of the responses! When the video is over, this subtest is over and you will be instructed to complete the remainder of the examination.

After each response, you will rate the effectiveness of the response using the following scale:

> A = Highly effective— providing the desired effect, impressive. Response provided extra effort and attention that made it distinctly better than satisfactory.

B = Satisfactory— fulfills the requirements resulting in a positive outcome, but nothing more. Response meets the standard but does not provide any extra effort (does not go above and beyond).

C = Substandard— below standard or less than adequate; will likely have a negative impact on the situation. Response may have positive points, but does not meet the standard of what would be expected or required for the situation.

D = Unacceptable—clearly inferior. Without a doubt the response would end in a negative outcome; definitely wrong.

Each response can have any rating, so rate each response independently of the others. For example, response 1 could be highly effective and response 2 could also be highly effective. For each response consider the entire A/B/C/D scale.

No specialized training, knowledge, or experience is required for this subtest. Rather, your answers should draw on the general knowledge and life experience you have acquired (e. g., in work, school, extracurricular, and/or community activities).

Suggestions on how to do your best with Situational Judgment

Be attentive to each of the scenarios. Once you have made your selection, look back at the screen to prepare for the next response to begin.

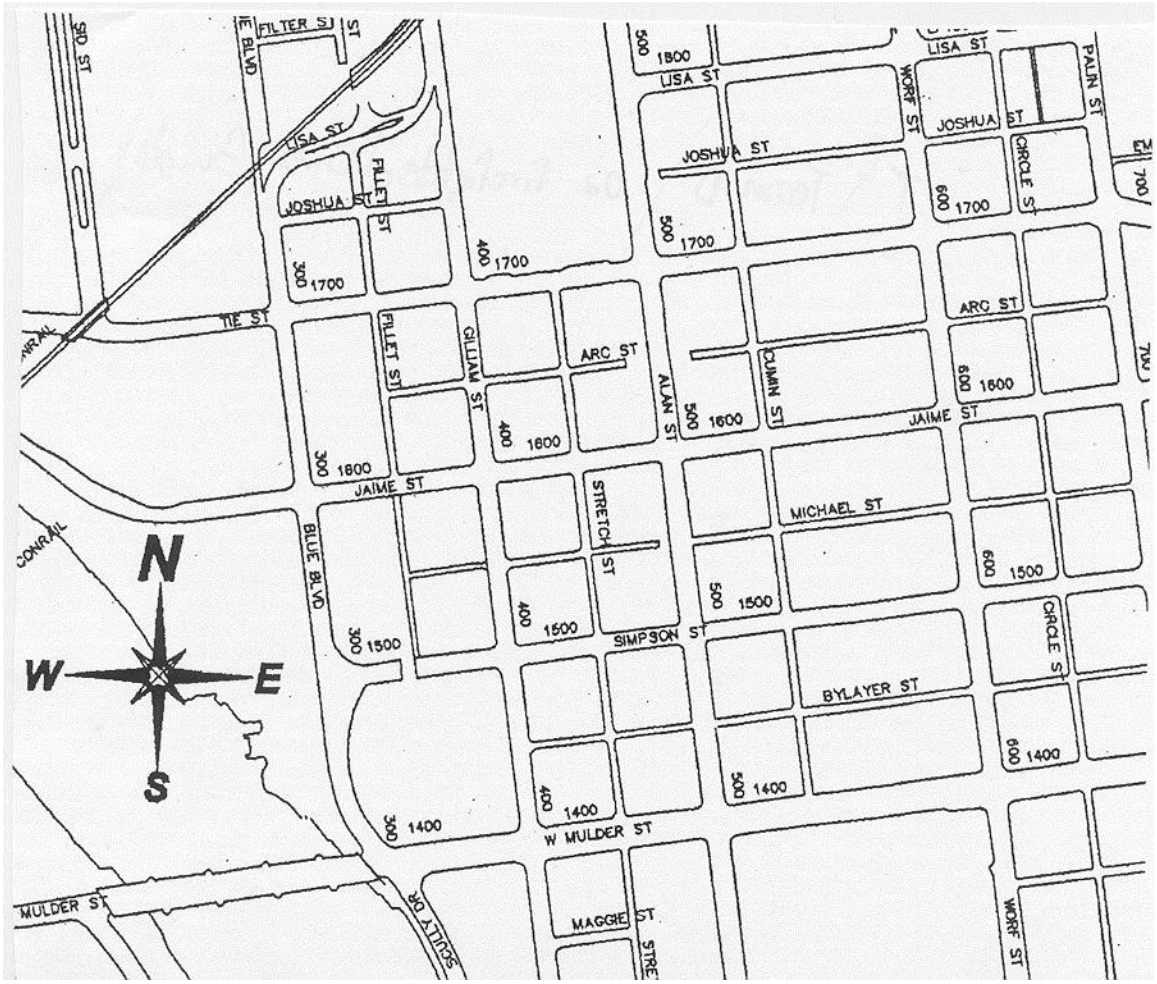
Use the entire scale, consider all four possibilities for each response.

While viewing the responses pay careful attention to tone, wording, and demeanor.

Subtest 2—Map Reading and Following Directions

This section of the exam is designed to test your ability to follow directions and read maps. For this section of the exam you will answer questions regarding a map. You should have familiarity with directions, north, east, south, and west when reading a map and be able to follow written directions related to the map.

The following pages contain a map followed by the type of questions that may be asked on this portion of the test.



1. What direction is the intersection of Arc Street and Worf Street from the intersection of Alan Street and Lisa Street

A. Northeast
B. Northwest
C. Southeast
D. Southwest

2. Which of the following streets is the southernmost street on the map?

A. Filter
B. Palin
C. Maggie
D. Sid

3. You are traveling west on Simpson Street approaching Gilliam Street and need to take the shortest route to reach W. Mulder Street. Assuming all streets are two-way streets, what direction would you turn on to Gilliam Street?

A. north
B. south
C. east
D. west

Answers for map reading questions:
C/C/B

*Please note the map on the examination will provide the direction North only. You will be expected to determine the other directions.

Subtest 3—Mathematics

The purpose of this section is to test your ability to add, subtract, multiply and divide whole numbers, fractions, and decimals, and your ability to apply formulas/math principles to practical situations.

1. Basic arithmetic (adding, subtracting, multiplying, and dividing)
2. Word/story problems
3. Mathematics involving fractions and decimals
4. Conversion Problems (inches/feet/yards, ounces/pounds, ounces/pints/quarts/gallons, and seconds/minutes/hours)
5. Simple geometry such as finding the area or perimeter of a rectangle

The following conversions and formulas are available to you in this study guide. This information, however, will **NOT** be provided to you during the test. You should study and gain an understanding of this information prior to taking the test.

12 inches = 1 foot; 3 feet = 1 yard; 1,760 yards = 1 mile;
100 centimeters = 1 meter; 1000 meters = 1 kilometer
1 acre = 4,840 square yards

16 ounces = 1 pound;
2 cups = 1 pint; 16 ounces = 1 pint; 2 pints = 1 quart; 4 quarts = 1 gallon;

60 seconds = 1 minute; 60 minutes = 1 hour; 24 hours = 1 day;
52 weeks = 1 year; 365 days = 1 year

area of a rectangle = width x length
perimeter of a rectangle = 2(width) + 2(length)

NOTE: Candidates will NOT be permitted to use calculators during the exam.

Mathematics Sample Questions

1. 2/3 +3/4+5/8=?

A. 2 1/24
B. 10/24
C. 10/15
D. 1 23/24

The answer is A. To complete this problem you must first find the lowest common denominator. In this case 24 is the lowest common denominator. Each fraction must be converted to have the denominator of 24 before adding the fractions. The problem then looks like this 16/24 + 18/24 + 15/24=? Now the numerators may be added, this totals 49/24. This should be reduced to the mixed number of 2 1/24 (Answer A).

2. 1644 is what percentage of 4110?

A. 10%
B. 20%
C. 30%
D. 40%
E. 50%

The answer is D. See solution below.

```
        0.4
4110| 1644
    - 0
      16440
    - 16440
          0
```

3. Which of the numbers below best completes the series: 121, 144, 169, 196, 225, _____

A. 256
B. 265
C. 274
D. 283

The answer is A. The difference between each number in the progression increases by two, as shown below.
144 – 121= 23
169 – 144= 25
196 – 169= 27
225 – 196= 29
??? – 225= 31
??? = 31 + 225 = 256 (Answer A)

Also, the sequence is 11^2, 12^2, 13^2, 14^2, …

4. What is 20% of 650?

A. 120
B. 130
C. 150
D. 520
E. 1300

The answer is B. To calculate the answer, transform 20% into a decimal. (.20) Then multiply .20 and 650. Place the decimal two digits from the right to account for the two decimal places in the problem.

```
  650
 x.20
  000
1300
130.00
```

5. You are fighting a fire at a plastics manufacturing company. The entire building sits on a city block that is a rectangle consisting of exactly one acre. You know that the length of the block is 121 yards, but you need additional hose to cover the width of the block. If you need exactly the same length hose as the width of the block, how many yards of additional hose do you need, if one acre is equal to 4,840 square yards?

A. 40
B. 121
C. 2,420
D. 4,719

The answer is A. To calculate square yards, you multiply length by width. Since one acre is 4,840 square yards, you divide 4,840 by 121 (length) to get the width, which is 40 yards. This is equal to the amount of additional hose that is needed.

```
      40
121| 4840
   - 484
      00
   -  00
       0
```

6. Which of the numbers below best completes the series: 2, 4, 12, 48, _____

A. 56
B. 72
C. 96
D. 240

The answer is D. To determine the next number in the sequence, determine the relationship between the numbers. The difference between each number in the progression is multiplied by the next highest number as shown on the next page:

2 x 2= 4
4 x 3= 12
12 x 4= 48
48 x 5= 240 (Answer D)

Subtest 4—Reading Comprehension

This section of the exam is designed to test your ability to read a passage and then answer questions based on that passage. In this section you will be given a passage to read and questions to answer based on that passage. Please select the best answer based on the passage. When answering the questions, you may refer back to the passage if necessary.

Do not try to memorize the text as you read. It is more useful to try to understand the events and relationships described. You can always go back to the text to check for descriptions and actions after you read the questions.

Reading Comprehension Sample Questions

The following pages contain two sample reading passages along with examples of the types of questions that may be asked.

Reading Passage 1—"Physical Demands of Firefighting"
Fighting fires is tough business, and firefighters need to make sure they are physically fit. Even though firefighters today make more emergency medical runs than fire runs, fires still occur. At the fire scene, firefighters work as a team with each team member contributing to the total effort. Typical tasks include extending hose lines that may be charged or dry, carrying and climbing ladders, using saws or axes to make holes in roofs, or using a pike pole to tear down plaster and drywall. Uncommon, but important tasks, include removing victims from the fire structure or pulling oneself or another firefighter out of a burning building.

To see how demanding the job is, consider the task of extending a fire hose. The fire hose is neatly folded on the bed of the fire truck in 100-foot sections, and each section weighs close to 50 pounds. A single firefighter may have to pull the hose off the truck, and drag it into the building. Before advancing the fire hose into the fire, the hose will be filled with water. When filled with water, the hose is said to be charged. Now, when the firefighter drags a hose, each ten-foot section can weigh close to 50 pounds! Few would argue that the firefighter needs to be in good physical condition to perform this task quickly.

Firefighting is so physically intense that demands made of the cardiovascular system have been studied. In one of these studies, firefighters wore a Holter electronic cardiographic monitor that allowed their heart rates to be monitored while they fought fires. Researchers found that during their peak work effort, their hearts worked at near maximum capacity. In one case, a firefighter worked so hard that his heart beat at a rate of 180 beats per minute for one hour and 56 minutes—a truly remarkable feat that few can match!

To make sure they are ready to respond at the fire scene, men and women, who are Columbus Firefighters must take time to stay in shape. Staying in shape commonly has three components: strength, aerobic, and flexibility training. Strength training requires the individual to develop the muscular capacity of the arms, legs, and torso. Good exercises for developing strength include push-ups, sit-ups, pull-ups, and 40-yard sprints. Aerobic training focuses on keeping the heart and lungs fit. Good exercises for aerobic training include running or

swimming for more than 12 minutes at a time. Many firefighters can run a mile and a half in twelve minutes. Finally, flexibility is concerned with being able to reach and twist and is obtained by doing stretching exercises. Clearly, firefighters must commit to be fit!

1. The main point made in this passage is that

A. adding water to a fire hose increases its weight
B. doing push-ups will help one drag fire hoses
C. firefighters must maintain their physical abilities
D. firefighting involves physical competition among the firefighters

The answer is C. This passage gives examples of how physically demanding the job of firefighter is, provides results of studies that have been completed about the physical demand of the job, and provides examples of techniques firefighters can do to maintain their physical fitness. Answers A and B are simply examples which support the main theme of this passage, but are not comprehensive enough to be considered the main point. Answer D is not mentioned in the passage and is therefore incorrect.

2. According to the passage, which firefighting task is performed least frequently?

A. carrying ladders
B. climbing ladders
C. dragging victims
D. making holes in roofs

The answer is C. In the first paragraph examples of typical tasks performed by firefighters are given, among these carrying ladders, climbing ladders, and making holes in roofs are listed. The last sentence in the paragraph gives examples of uncommon tasks, dragging victims is listed as an uncommon task. The word uncommon indicates tasks that would be performed less frequently than typical tasks.

3. The word <u>cardiographic</u> is unusual. Based on the context of the paragraph, it most nearly means

A. a 12-lead EKG
B. a device showing heart rate
C. a diagram showing the cardiovascular system
D. a snapshot of the heart at a given moment

The answer is B. In the third paragraph it is stated, “firefighters wore a Holter electronic cardiographic monitor that allowed their heart rates to be monitored while they fought fires.” Answer A is incorrect because not enough information was given in the passage to indicate that this monitor was a 12-lead EKG. Answers C and D are also incorrect because no mention was made of a diagram as mentioned in C or snapshot as mentioned in D.

<u>Reading Passage 2—“Test Taker”</u>

I am the world's worst test taker. My test scores never reflect how much I know. Every time I take a test, it's the same. It starts the day before. I become anxious, worried, terrified; I can't eat, I can't sleep. Why do I have to take this test? Don't they know how much information I have in my head?

On the way to the test I can't concentrate on anything. All I can think about is how bad my score will be, and what they'll think of me when they see that score. I know I will miss most of the answers, but not because I didn't know them. I will miss them because I can't take tests. But you try telling that to someone, that you understand everything even though it doesn't look like it on paper. They won't listen. They think they know everything from one little number; 42 out of 100 means you're nothing. It means everyone will label you, and overlook you for anything meaningful. "This is not what we expected from you!" Well, it's what I expected. That test doesn't know who I am at all! I know who I am, let me pick the score I deserve. Then you would better understand who I am. I'm not a 42, I'm a 98!

Walking into the room it gets worse, I start to sweat, my nerves are shot, and I can barely find my seat. The directions are a blur. Did someone call my name? By the time I hear, "You may begin," I'm so far gone, nothing can bring me back. For what seems like an eternity, I struggle to maintain my sanity. I try to read the words on the page, but they start swimming, and I can't catch them. The entire world wants me to fail this test. How can I compete? Why should I even try? They have their mind made up that I am nothing, and they don't care what I have to say about it. I feel lower than low. I look around the room for support, but no one even sees me. Everyone else is well on their way to a good score. I see them racing to the finish line and laughing at me all the way. They hate me. Suddenly I hear the words, "Stop. Put your pencils down." What? What do you mean? I'm not done, this isn't fair! I'm still working! Of course by then it's too late. By then the damage has been done. What's the use anyway?

Now it's time to get confirmation that the test was a disaster. As the papers are passed out, again I feel sick to my stomach. The Grim Reaper himself is walking toward my desk. I don't want to turn the paper over, but I know I must. Just do it quick, like ripping off a band-aid. OK, 1…..2…..3…..GO!

What? Can this be right? I got a 94? Oh, a 94, OK, a 94. I can live with a 94. I mean, I'm really a 98, but this is good too. Ok, maybe they do know what they're talking about. Hum, maybe I can do this after all. What? What's that? We have a test tomorrow? Oh no, I don't feel so good…..

1. The author of this passage feels the <u>most</u> pressure from

A. himself
B. the test administrator
C. fellow test takers
D. his parents

2. The author feels that a bad score will mean

A. he will have to take the test again
B. he doesn't understand the material
C. he is a worthless person
D. others in the class are smarter

3. The author may miss some of the test directions because

A. the test administrator is not clear enough
B. a fellow test taker is disturbing him
C. he is too distraught to listen
D. someone wants him to do poorly on the test

4. At the end of the passage, the author doesn't feel good because he

A. had a bad lunch
B. feels defeated about his score
C. is a pessimist
D. still has test anxiety

5. The author likens the Test Administrator to the Grim Reaper because he feels the Test Administrator

A. hates him
B. is delivering his fate
C. has a glamorous job
D. is excited about his score

Answers for second reading passage: A/C/C/D/B

Subtest 5—Mechanical Aptitude

For the purposes of this exam, mechanical aptitude is defined as the ability to manipulate three dimensional objects in space. This portion of the exam is designed to test your knowledge of basic mechanical equipment and its operation. Test questions will focus on the basic working principles of gears, levers, pulleys, knots, spatial reasoning and mechanical reasoning. Illustrations will be used as part of the questions.

Gears, Levers, Pulleys and Knots Study Areas

Questions regarding some of the following facts and terms may be asked on this portion of the multiple-choice phase of the examination.

General Terms and Facts

counterweight: a weight of equal size or force to balance a weight pulling in the opposite direction.
complicated machines: machines that have many moving parts.

force: strength or power, such as a push or a pull, applied to an object to cause movement.

friction: the force created when two objects touch or rub each other resisting movement between them.
gravity: the natural force that pulls all things toward the center of the earth.

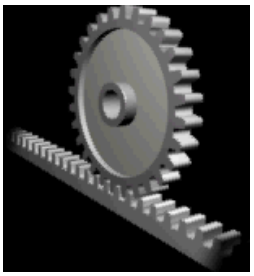
load: an object you want to move.

simple machines: machines that have few moving parts.

torque: a twisting force that causes turning or a rotating movement.

work: moving an object from one place to another.

Gears



spur gears **bevel gears** **worm gear** **rack and pinion**

gearwheel (gear): a wheel with teeth around its edge that interlock with the teeth of another gearwheel to create movement.

bevel gears have toothed wheels with sloping faces that mesh at a particular angle.

spur gears have toothed wheels that mesh to connect parallel shafts.

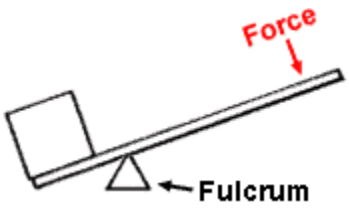
worm gears have a shaft with a screw thread.

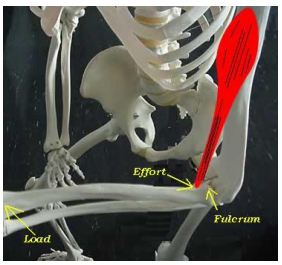
It is important to note the following;

- If gearwheels are the same size, they turn at the same speed.
- If one gear is bigger than the other they can be used to speed up or slow down movement or to increase or decrease force.
- Two spur gears interlocking will turn in the opposite direction of one another.
- A larger spur gear turns with less speed but with greater force than a smaller spur gear.

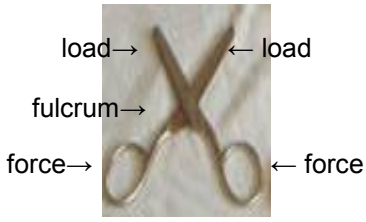
Levers

Load (the box) **Lever (the bar)**





lever in the human body: elbow



pair of levers

lever: a simple machine that consists of a rigid bar that pivots on a supporting piece to pry up or lift a weight on one end by means of pushing or pulling force on the other end.

fulcrum or pivot: the point or support on which a lever pivots.

inclined plane: a simple machine that consists of a flat surface, such as a plank or a ramp, set at

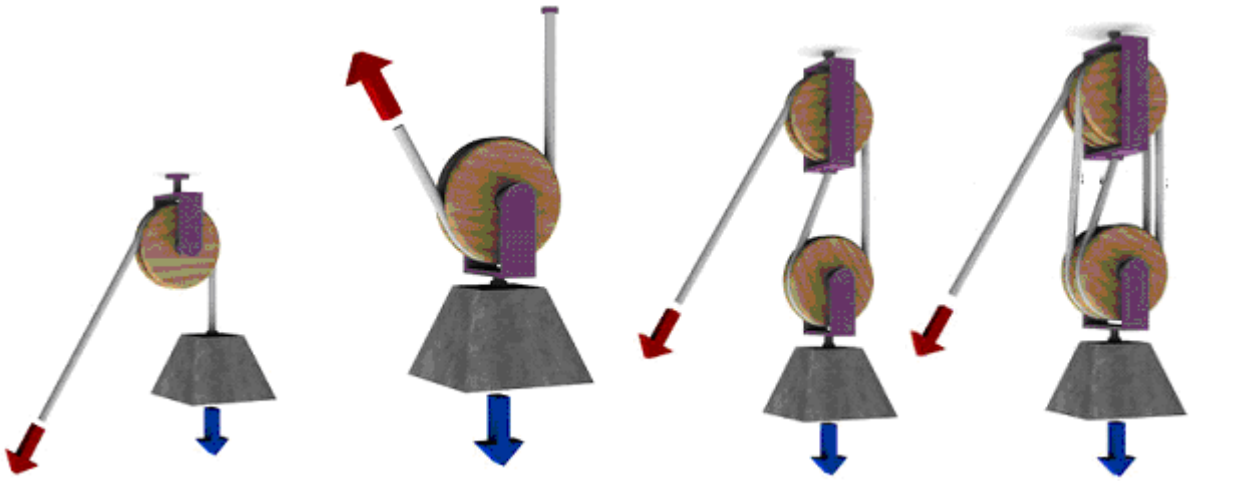
an angle that is less than 90 degrees.

A pair of levers, like scissors or pliers, has two lever arms joined at a pivot.

It is important to note the following:

- When the pivot of a lever is further away from the load the force needed to lift the load is greater than the weight of the load.
- When the pivot of a lever is in the middle of the lever the force needed to lift the load is equal to the weight of the load.
- When the pivot of a lever is moved closer to the load the force needed to lift the load is less than the weight of the load.

Pulleys



simple pulley | moveable pulley | compound pulley | block and tackle pulley

pulley: a wheel that has a rope looped around it, the rope fits a groove that runs around the edge of the wheel

compound pulley: two or more pulleys working together to decrease the effort needed to lift the load.

block and tackle: a compound pulley system that has more than one pulley wheel. The top pulley wheel, the block, is attached to a set point. The bottom pulley wheel, the tackle, is suspended on a rope passing through the block.

double pulley: this compound pulley system has two pulley wheels; pulling the rope raises the lower wheel and the load. With two wheels, only half the effort is needed to lift the load, but the rope has to be pulled twice as far.

fixed pulley: a pulley that stays attached in one place.

moveable pulley: a pulley that is attached to a load.

simple pulley: changes the direction of the effort on a load. You pull up instead of down or vice versa. It consists of one wheel and rope. The amount of force required to raise the load is equal to its weight.

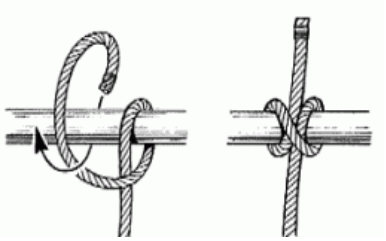
It is important to note the following;

- If the pulley is fixed, then the force required is equal to the weight.
- If the pulley moves with the weight then the force is equal to half of the weight.
- Another way of thinking about this is to divide the weight by the number of sections of rope supporting it to obtain the force needed to lift it.

Knots

square knot

cow hitch



clove hitch

figure-eight knot

Knots

square knot: The square knot is an ancient and simple binding knot used to secure a rope or line around an object. It is formed by tying a left-handed overhand knot and then a right-handed overhand knot, or vice versa.

cow hitch: The cow hitch is a hitch knot used to attach a rope to an object. The cow hitch contains a pair of half-hitches tied in opposing directions, as compared to the clove hitch in which the half-hitches are tied in the same direction.

clove hitch: The clove hitch is particularly useful where the length of the running end needs to be adjustable, since feeding in rope from either direction will loosen the knot to be tightened at a new position

figure-eight knot: The figure-eight knot is very important in sailing, rock climbing and rescue operations as a method of stopping ropes from running out of retaining devices.

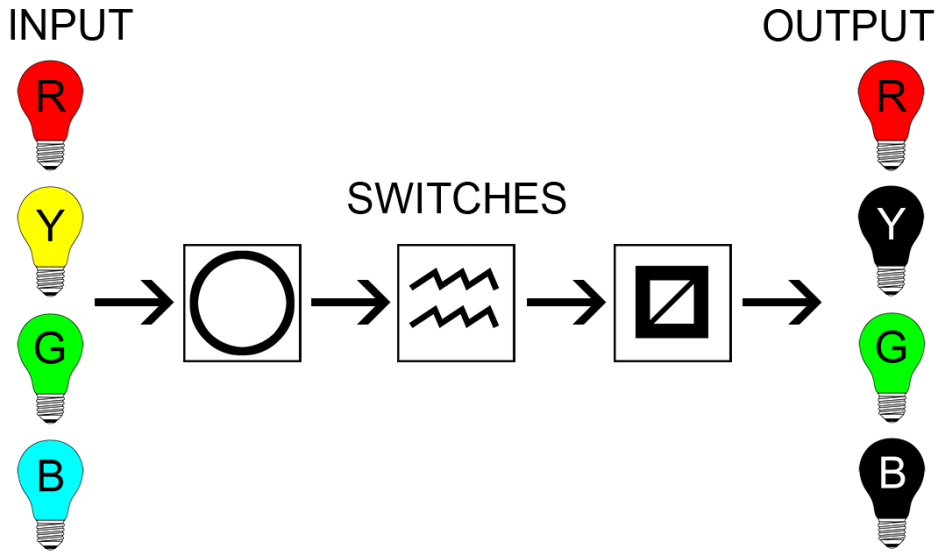
It is important to note the following;

- Knots weaken the rope in which they are made. When knotted rope is strained to its breaking point, it almost always fails at the knot or close to it, unless it is defective or damaged elsewhere.
- Relative knot strength, also called knot efficiency, is the breaking strength of a knotted rope in proportion to the breaking strength of the rope without the knot.
- In knots that are meant to grip other objects, failure can be defined as the knot moving relative to the gripped object. While the knot itself does not fail, it ceases to perform the desired function.

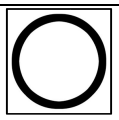
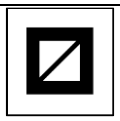
Mechanical Reasoning

For each of the mechanical reasoning questions, you will see a flow chart like the one below labeled FIGURE 000. Take note of the input, switches and output.

FIGURE 000



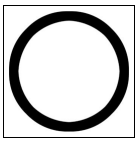
The key below shows four switches and their effects on the four colored inputs.

KEY			
Switch	**Function**	**Error**	**Error Code**
	All colors remain unchanged.	Red remains unchanged. All other colors turned off.	**A**
	Red and yellow remain unchanged. Green and blue turned off.	Green and blue remain unchanged. Red and yellow turned off.	**B**
	Turns on red and green. Yellow and blue remain unchanged.	Turns on yellow and blue. Red and green remain unchanged.	**C**
	Toggles all colors *(Any bulb on turned off, any bulb off turned on.)*	Toggles red and blue. Yellow and green remain unchanged.	**D**
NO ERROR			**E**
 **= red on**	 **= yellow on**	 **= green on**	 **=blue on**
 **= red off**	 **= yellow off**	 **= green off**	 **= blue off**

Use the key to diagnose which switch (if any) is broken based on the resulting error.

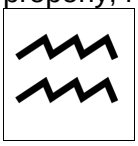
In the example labeled **FIGURE 000**, all of the inputs (red, yellow, green and blue) are on.

1. When these inputs pass through the first switch, and the switch is working properly, all colors remain unchanged.



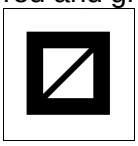
However, if the switch is broken, only red remains on and all other colors are turned off.
Each switch builds on the previous switch.

2. Thus, this modified input then passes through the second switch. If the switch is working properly, red and yellow remain unchanged, and green and blue are turned off.



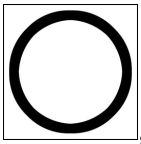
However, if the switch is broken, green and blue remain unchanged, and red and yellow are turned off.
Remember, each switch builds on the previous switch.

3. Finally, this modified input passes through the third switch. If the switch is working properly, red and green are turned on, and yellow and blue remain unchanged.



However, if the switch is broken, yellow and blue are turned on, and red and green remain unchanged.

To clarify, you will need to compare the input with the output to determine which of the switches, if any, is broken.

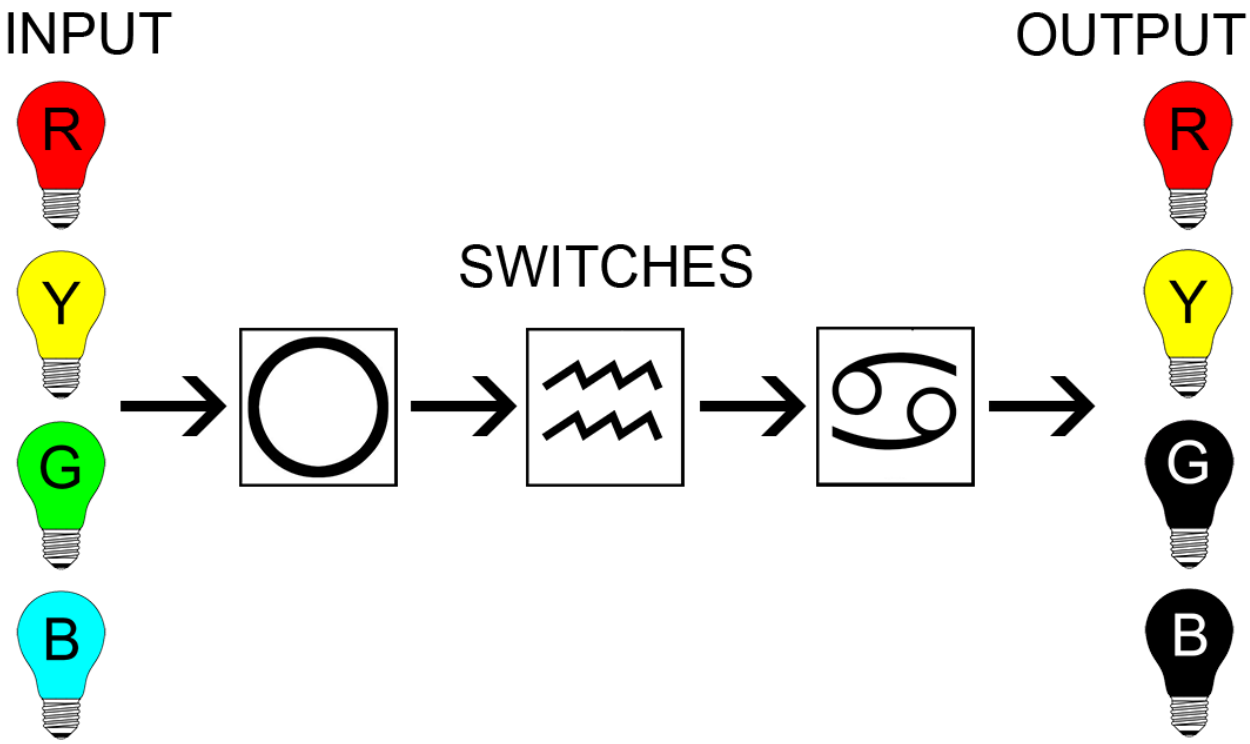
In the case of **FIGURE 000**, it is the first switch,  , that is broken. Thus, the error code according to the key is "**A**", and the answer for your answer sheet would also be "**A**".

Note that the fourth switch (not used in this example) "toggles" the lights. It switches a color off if it is on and switches a color on if it is off.

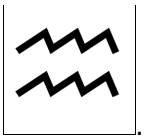
A good test taking strategy for solving these problems is to determine what the theoretical output would be if all switches worked properly, then deduce which switch, if any, must be broken to produce the actual output.

Mechanical Reasoning Sample Questions

1. Determine which switch is broken and use the key to select the corresponding error code.

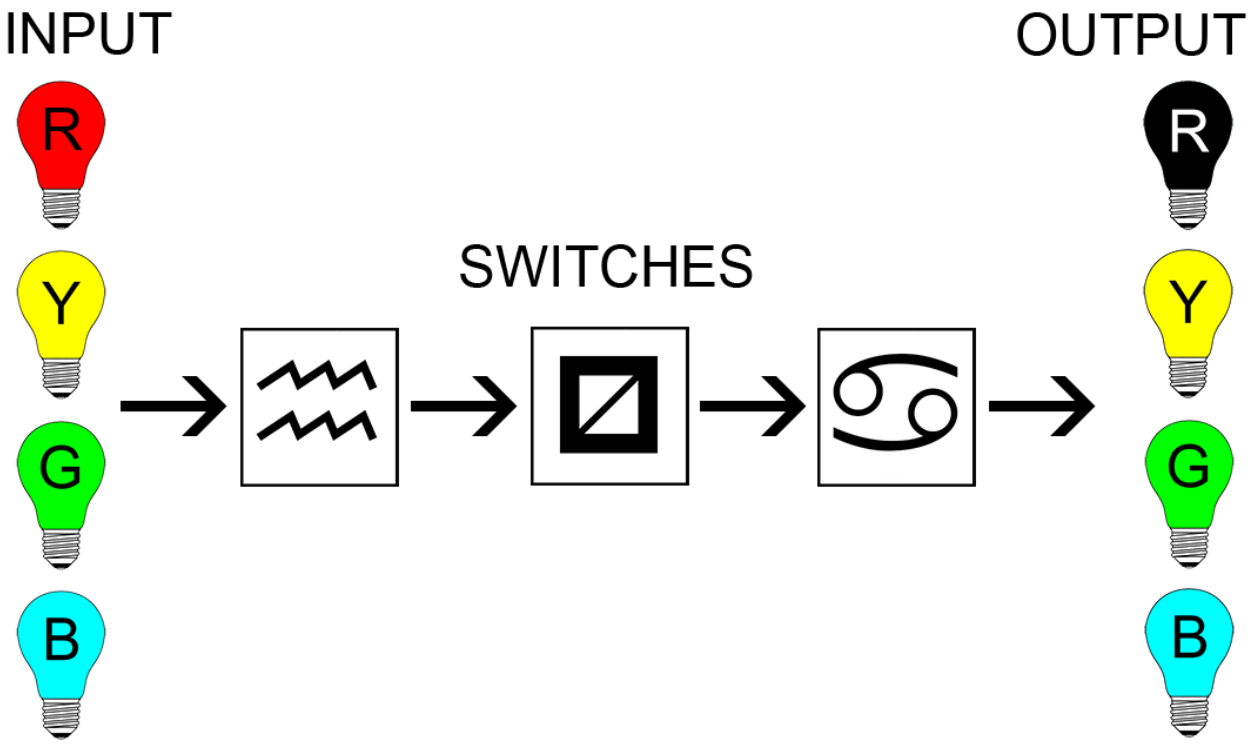


A. A
B. B
C. C
D. D
E. E

The answer is “B”. The error is in the second switch represented by this symbol  .

The best way to approach the mechanical reasoning items is to first determine what the output would look like if there were no errors in the switches. If all switches functioned properly, the output would have shown red and yellow off, and blue and green on. Next work through each switch. An error in the first switch (A) produces a result with red on, and yellow, blue and green off. Thus, there is no error in the first switch. An error in the second switch (remember the colors are unchanged through the first switch) leaves green and blue unchanged, while switching off red and yellow. The third switch toggles all colors, resulting in red and yellow being turned on while green and blue are turned off. Thus, “B” is the correct answer.

2. Determine which switch is broken and use the key to select the corresponding error code.



A. A
B. B
C. C
D. D
E. E

The answer is “D”. The error is in the third switch represented by this symbol  .

The best way to approach the mechanical reasoning items is to first determine what the output would look like if there were no errors in the switches. If all switches functioned properly, the output would have shown only blue on, and red, yellow and green off. Next work through each switch. An error in the first switch (B) produces a result with only yellow on, and red, green and blue off. Thus, there is no error in the first switch. An error in the second switch (C) turns on yellow and blue, with red and green unchanged. This would produce a result where only green is on, and all other colors are off. Thus, there is no error in the second switch. An error in the third switch (D) toggles red and blue, while leaving yellow and green unchanged. This produces the same output as pictured above with red off and all other colors on. Thus, “D” is the correct answer.

Phase II—Firefighter Oral Assessment Mechanism (FOAM)

The Firefighter Oral Assessment Mechanism (FOAM) is a video-based examination that tests your problem solving and interpersonal relations skills. This exam is not intended to test any fire policies or procedures. You will watch six scenes and at the conclusion of each scene respond verbally as if you were a firefighter or medic in that situation. The scenarios are set in a fire environment, meaning they take place in locations involving firefighters and fire situations. However, NO medical, fire suppression or other knowledge that will be obtained in the fire training academy will be assessed. Again, the examination tests problem sensing and resolution skills and interpersonal relations skills.

FOAM Test Administration

Before you take the examination, you will receive instructions explaining the process with a small group of candidates. The group will be shown a sample scenario and will have an opportunity to ask questions related to the structure and format of the examination.

You will then be seated in an individual room to take the examination. During the test you will be seated at a computer screen, and you will remain seated throughout the test. A Civil Service staff member will start the video and start a video camera to record your responses, before leaving the room.

The test video begins with additional instructions and contains one practice scenario. You will have the opportunity to respond to this practice scenario as a warm-up for the actual test. No one will view your response to the practice video; it is presented to give you a chance to get comfortable with the process.

There are six different test scenes. These scenarios are simulations of situations that a firefighter or medic may encounter. The scenes may involve fellow firefighters, fire officers (chain of command) and/or members of the public. These scenarios will be shown as a video in the form of a series of still pictures with audio voice-overs. Note that this is NOT an interactive video, so the people on the screen will not talk back to you. Each scene lasts one to two minutes, and your response should be directed to the last person(s) shown on the screen at the end of the scene.

At the end of each scene, the words “Respond Now” will appear at the bottom of the screen. You will have 40 seconds to provide a response. You are not required to use the full 40 seconds, however your response should 1) be complete, 2) demonstrate an understanding of the situation and 3) effectively communicate a plan for solving the problem.

Respond as if you are actually present at the scene and talking to real people. This is not an interview, so candidates who respond by saying what they would do (“I would calm everyone down, I would resolve the problem”) instead of talking to the people on the screen will not receive points for those actions. “Would do” statements do not demonstrate that you have the ability to carry out the actions.

While you may ask questions of the people in the scenarios when appropriate, do not use questions alone as your response. In order to receive a good score you should respond in a manner that demonstrates a resolution to the situation.

When your 40 second response time has expired the next scene will begin.
The entire test will take approximately 25 minutes to complete once you are seated in your individual test room.

A video camera will record your responses. At a later date, a panel of raters (two Division of Fire personnel and one Civil Service analyst) will assess your responses based on the scoring dimensions described below.

Scoring FOAM

You will be scored on two dimensions: Problem Sensing and Resolution, and Interpersonal Relations. Both dimensions are graded using a five-point scale, with a five being the highest score.

Scoring Dimension 1: Problem Sensing and Resolution

This dimension assesses your ability to critically evaluate a situation and comprehend it in its proper perspective; to identify underlying as well as the obvious issues; to assess alternative solutions; and to consider the implications of problems and solutions.

There are multiple ways to approach the problems in each scenario. You are not expected to know how the Columbus Division of Fire would solve any of these problems. Use your life experiences in dealing with the people in each scene and make sure you are clear about how you are solving or beginning to solve the problems presented. Draw on your involvement with friends, family, classmates, and co-workers to help you deal with these situations.

Scoring Dimension 2: Interpersonal Relations

This dimension assesses your ability to establish and maintain cooperative and constructive relationships; to consider the feelings and needs of others; and to respect the views of others.

Your body language, the tone of your voice, and the words you choose are all rated as part of this score. Your facial expression should match your words. If you are attempting to talk to a co-worker who is having problems at work and who may need to be consoled, your expression should be sympathetic as opposed to laughing or smirking. If you are attempting to persuade someone, you might lean forward and talk sincerely instead of yelling at them or being sarcastic.

FOAM Preparation Tips

Preparing for and practicing in advance of the FOAM exam may help you to feel more comfortable in the test environment and may improve your performance on the exam.

The FOAM test scenes may be in a number of different settings such as a fire station or in a home of a person who called for service. One sample scenario and response is provided on the Civil Service Commission website at: https://www.columbus.gov/civilservice/uniformed-fire-series/Firefighter/

Consider the types of situations that may be presented. You may concentrate on customer relations experiences that you have had or experiences with co-workers, friends or family in which a problem or verbal conflict arose. You can also consider situations that are shown in a television show or on the internet. Focus on a problem that involves people and requires a response or conversation. While you practice for this test, you could write down situations, or you might view and then pause a scene on a television or on a computer. Then you can practice your response as if you are taking the test.

You may want to practice in front of a mirror, with a friend (who does not respond) watching, or you may want to video record your response. If you partner with a family member, friend or colleague they may be able to provide you feedback regarding how well you resolved the problem and on the interpersonal skills that you displayed. They should read the information on the scored dimensions in the previous section to guide them in their feedback. This test is not scored like a multiple-choice exam in which there is a single correct response; instead there may be a variety of solutions to the scenes where you can demonstrate your problem solving skills and interpersonal relations.

By practicing responding, you can gain familiarity with the process, a sense of how to continue a response while solving a problem, and an understanding of how much information you can give in a 40-second time period. Since the FOAM test is not interactive, the individuals in the scenes will not provide you with feedback or responses that would help you gauge the effectiveness or impact of your responses. Practicing your responses when you are not getting immediate feedback may help you feel more comfortable with the testing process.

Tips to Guide your Response to the FOAM Scenarios

Consider the following tips to guide your response in each segment of FOAM.
The three segments are: while you watch the scenes, when you respond to the scenes and while you wait for the next scene.

While watching a scene:

Listening and observing are important parts of FOAM. While you are watching the scenario, there are several things that you should be doing to formulate an appropriate response.

- Watch and listen to the video. As the scenario unfolds, you should listen to the characters and be attentive to the visual cues given in the scene.
- Identify the main problem and any underlying problems that are presented.
- Formulate your response. Begin to develop alternatives on the best way to resolve the immediate situation. Consider whether any long term issues and/or underlying concerns should be addressed.
- Ask yourself, “Do I need any additional information to resolve the situation?” If you do, you can ask the questions during your response. Even though the characters will not respond, the evaluators who are scoring the exercise will know that you have acknowledged that specific information would be helpful in bringing the situation to a resolution.
- Decide on the proper attitude for the situation. As you formulate a solution to the scene, ask yourself, “How should the character(s) be approached?” The situation could call for a stern response or a gentle, comforting response. You will want to display the most appropriate interpersonal approach for the situation.

During your response:
When the scenario is over, the video will display the words, "Respond Now." Be sure you are paying careful attention to the screen as your time begins when these words are displayed. During your response consider the following:

- Respond to the character displayed on the screen and continue to look at the screen.
- Provide a solution, or suggestions for a solution, to the character(s) displayed on the response screen.
- Respond with appropriate behaviors for the situation and the character(s) to whom you are talking.
- Use your facial expressions, tone of voice, and body language to help you communicate your intended message.
- You may ask questions, however, you will not get any response so quickly continue with your answer.
- You may direct the person on the scene to do something.
- You should focus your response to the person(s) displayed on the final screen, which displays "Respond Now."
- Do not respond until you are instructed to do so.
- Remain seated for the entire test.

After your Response:
After you complete your response to a scene wait for the next scene to begin. After your response to each scenario consider the following:

- After your response, maintain attention on the screen, you will not want to miss anything in the next scenario.
- If you complete your response prior to the end of the 40-second allotted time, simply wait for the next scene to begin.
- If you think of something that may help resolve the current scene while waiting for the next exercise—say it. Your entire 40-second time period will be considered by the evaluators.
- When the next scenario begins do not try to evaluate your last response. Pay close attention to the scenario on the screen so you can do your best on each scenario.
- You will not be scored for anything prior to or after the 40-second response times.
- You will not be scored for anything you do during the scene's non-response time.
- When the test is over, follow the directions on the screen. This will alert the test staff that you have completed your examination.

FOAM Test Taking Tips Summary
The following is a summary of the key tips to remember during FOAM.

- There is no particular dress requirement; however, graphic t-shirts should be worn with caution. Use your best judgment.
- Respond to the practice scenario at the beginning of your test. Take advantage of this opportunity to get comfortable with the video test format before the actual test scenarios begin.
- Think about what you want to say before you begin to speak. There is no penalty for waiting a few seconds to compose your thoughts.
- Speak slowly and distinctly. Sometimes we speak quickly when nervous, so make a conscious effort to slow down. Know your tendencies and adjust accordingly. The 40

seconds provided should be enough time to address the issues. Remember, the people in the scenes will not be talking back to you, therefore giving you the entire 40 seconds to talk uninterrupted.

- There will not be a timer on the screen as you respond, concentrate on providing as much information as you can during the time provided.
- Address the key issues in your resolution of the problem.
- Demonstrate appropriate emotion for the issues.
- Do not think of your test performance as "acting." Instead pay careful attention to the scenario as it is presented, place yourself in the situation and respond appropriately.
- Distinguish between scenarios that require a more serious, calm response and a less serious but sensitive response. Remember that firefighter is a public service position and that every citizen, coworker or supervisor that addresses you expects an appropriate response.
- Ensure that a portion of your response includes PROBLEM RESOLUTION. Interpersonal relations are important, but interpersonal relations alone will NOT solve the problem. Be sure you include BOTH dimensions in your response.
- AVOID the use vague terms such as "we'll take care of it" or "we'll go from there."

Keys to a good score

Simply put, the key to a good score involves the three **P**s: Problem, People, & Plan.

- **P**roblem: Identify the **P**roblem.
- **P**eople: Address the **P**eople appropriately.
- **P**lan: Present your **P**lan to resolve the problem.

Phase III—Firefighter Mile

The Firefighter Mile consists of ten events. There is NO break between events. The events require cardiovascular fitness, muscle strength, muscular endurance, flexibility, and stamina. Each event will be timed. During all events, you will wear a forty-pound weighted vest, which approximates the weight of the clothing, equipment and breathing apparatus that a firefighter normally wears during these types of activities. For the first event you will wear an additional forty-pound weighted vest to simulate carrying additional necessary equipment.

Important Notes Regarding the Firefighter Mile

- Prior to this phase of the examination, all candidates who pass the multiple-choice phase AND the FOAM phase of the exam will be notified of their Firefighter Mile test dates, along with dates prior to the test in which candidates can practice the actual Firefighter Mile events.

- Wear clothing appropriate for physically demanding work.

- Wear sneakers or rubber soled shoes.

- You will be provided with a forty-pound weighted vest during this phase of the exam. You must wear the forty-pound vest provided to you. You will also be provided gloves.

- Participants may not use any extraneous piece of equipment (e.g. harness, straps) that may help them in an event. You may use only the material and equipment provided for the test event. However, personal safety appliances (e.g. knee brace, ankle brace, back brace) will be allowed, but they will not be provided.

- Caution on wearing shorts as multiple events are performed on the floor.

Because the Firefighter Mile is physically demanding, you are urged to drink plenty of fluids at the beginning of the day, before the test, and continuing up until the time you are tested. Avoid drinking caffeinated beverages. You are also advised to stretch and warm-up before participating in the test.

The events are described, in the sequence completed, in a separate preparation guide along with a video of each event provided at:

https://www.columbus.gov/civilservice/uniformed-fire-series/Firefighter/

Confidentiality

The content of the examination is confidential. Once you have taken the examination, DO NOT share information with other candidates. Sharing information about the content of this exam may give other candidate's an advantage. Scores differing by one or two points may mean the difference between becoming a firefighter, and not becoming a firefighter. Additionally, giving information to other candidates may be grounds for disqualification. Finally, there are a number of different versions of the same exam; the ones you receive may be different from those given to other candidates.

Final Firefighter Examination Results

For Individuals who pass ALL THREE PHASES of the examination, the scores from FOAM will be used to band candidates into the 90, 80, or 70 bands. Your name will be placed on the eligible list by band. Those individuals assigned to the highest band will be considered prior to individuals assigned to the lower bands, provided the highest band includes at least five individuals who wish to be considered for appointment. Once the highest score band is reduced to fewer than five individuals, the next higher score band is combined with the highest score band until a selection can be made. Veteran's preference points will be added to passing scores of qualifying candidates prior to being placed within the respective bands.

Summary

The job of firefighter involves emergency situations and therefore should not be entered into lightly. A firefighter has a great deal of responsibility and therefore the selection process to become a Columbus Firefighter is extensive. The steps to the Selection Process, including the background process can be found on our website at https://www.columbus.gov/civilservice/uniformed-fire-series/Firefighter/. It is important to adequately prepare for each phase of the examination and the overall process as a whole. The

Multiple-Choice and FOAM phases will be administered in the same day, and the Firefighter Mile will be administered on a different day for those successful on the first two phases. After the Eligible List is established, the selection process will likely continue at a slower pace. The number of firefighters hired is difficult to predict in that it is contingent upon the number of retirements, the annual budget, and other factors that are continually updated. Therefore, the background process only moves as fast as the needs of the Division. Patience and perseverance is important throughout the selection process. Make sure you are prepared for the next phase of the process BEFORE you receive a notice. For example, if the personal history questionnaire is your next step, begin obtaining information that will be asked of you. If the stress test is your next step, make sure you are in your best physical condition. Make sure you inform us if your email or street address changes so that contact is never lost.

The information provided in this study guide may seem overwhelming, but is offered NOT to discourage candidates from the position, but rather to educate and provide realistic information to candidates. Many people begin the process of becoming a firefighter, but do not continue once they learn there is a great deal of hard work, dedication and responsibility involved. The City of Columbus takes great pride in our uniformed Firefighters and work hard every day to uphold the standards set by the Columbus Division of Fire. Each step of the selection process has been carefully constructed and is necessary to ensure that citizens and visitors of Columbus are kept safe every day. We encourage you to stay informed by taking advantage of the information provided by Civil Service so that you can perform your best. If we can be of assistance please call us at 614-645-0879. By staying informed, preparing for the process and committing to this process you will significantly increase your likelihood of success.

References:

Kindersley, D. (1995). *How Things Work: 100 ways parents and kids can share the secrets of technology.* London: Limited.
Oxlade, C. (1998). *Young Scientist Concepts and Projects.* Milwaukee, WI: Gareth Stevens Publishing
Walker, S., Feldman, R. (2002). *Pulleys.* Minneapolis: Lerner Publications Company

T:\teamd\17 Firefighter\Candidate Information\Study Guide\Study Guide.doc